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SECTION IV.—RIVERS AND FLOODS.

RIVERS AND FLOODS DURING MAY, 1917.

By ALFRED J. HENRY, Professor in Charge.

[Dated: River and Flood Division, June 29, 1917.]

The month was free from floods of a general character, although several of the great rivers were in moderate flood throughout some part of their respective courses. The Mississippi was in flood between Quincy, Ill., on the north and Grafton, Ill., on the south, and it was also in flood for a short time in the stretch between Arkansas City, Ark., and New Orleans, La. The flood in the middle stretch of the river had its origin in the run-off from melting snow in Minnesota and Wisconsin, augmented by heavy rains in Missouri, Iowa, and Illinois during the last week of April. The run-off from the rainfall happened to synchronize with the run-off from snowfall above mentioned; hence the occurrence of a flood in the middle stretch of the river. The principal damage due to this flood was occasioned by the breaking of levees and the flooding of lands in certain drainage districts in the Hannibal, Mo., river district. The flood in the lower river was a continuation of the flood described in this REVIEW, April, 1917, 45:176.

The following account of the spring flood of 1917 in the Memphis district is of value in this connection.

HIGH WATER IN THE MEMPHIS DISTRICT, 1917.

The spring rise in the Mississippi River in the Memphis district was first indicated by a sharp rise at Cairo, Ill., on February 22, which reached Memphis on February 24, and Helena, Ark., February 25. The stages on those dates were considerably below the seasonal normal, but during the following 9 or 10 days the daily rise amounted to a foot or more, bringing the river to flood stage at New Madrid on March 13; Memphis, March 21; Helena, March 22.

The numbers of days from the beginning of the rise until the arrival of the flood crest were as follows: New Madrid, 42; Memphis, 44; and Helena, Ark., 47.

The maximum stages and dates, with the number of days above flood stage, are as follows:

New Madrid, Mo., 39.3 feet, April 4; above flood stage, 39 days.
Memphis, 40.1 feet, April 9; above flood stage, 32 days.
Helena, Ark., 49.9 feet, April 13; above flood stage, 36 days.

There is a remarkably close resemblance between the spring rise of the present year and that of 1907, except that the latter occurred somewhat earlier in the season. The crest stages at Cairo and Memphis were each only two-tenths of a foot higher in 1907 than the record for the present year, while at New Madrid the crest stages in both years were the same. Also the gage relation both as to height and time movement of the crest, were practically the same throughout the district while the area inundated was identical in both cases.

The overflowed territory in 1917 embraced all of the island plantations as well as the low lands on the east bank of the river, known as the Tennessee Bottoms, and all of the lands unprotected by levees in Arkansas and southeast Missouri, in all considerably less than during the February flood of 1916.

Owing to the high water, all levee and other river improvement work was suspended for a period of about 40 days and caused serious delay in farm work. In a few cases mills were obliged to close down for a time, but otherwise no serious inconvenience to mill owners occurred.

The first flood warning was issued on March 16, and on March 20 the information that a stage of 39 feet was probable, caused farmers and others occupying the territory liable to overflow at that stage to remove their stock and workmen to places of safety. One firm in Memphis having a large amount of cotton stored in a warehouse, having its floor on a level with a 38-foot stage on the Memphis gage, at once began moving the cotton and thereby saved it from injury. Without the warning the loss would have amounted to several thousand dollars. One mill owner who heeded the warning constructed a temporary embankment about the plant, and as a result there was no suspension of work and there was no damage to the stock on hand.

The principal loss occasioned by the high water was the suspension of river improvement work and the consequent loss of wages and the delay in farm work that is keenly felt at this time. There was no real damage worth mentioning.—*S. C. Emery, Meteorologist.*

A few rivers in the Ohio Basin reached flood stage during the closing days of the month, but no damage was done.

The Columbia River was in flood in the upper reaches of the stream, and the flood continued into June. The lower Colorado was not in severe flood because the low temperatures over the higher portions of the watershed prevented a rapid melting of the winter's snowfall. The same cause, low temperature, was effective in retarding the annual flood in the Columbia.

Details as to dates of occurrence and crest stages observed in the various rivers throughout the country will be found in Tables 1 to 4, below.

Hydrographs for typical points on several principal rivers are shown on Chart I. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.

TABLE 1.—*Flood stages in Atlantic Coast and Great Lakes drainage May, 1917.*

River.	Station.	Flood stage.	Above flood stages—dates.		Crest.	
			From—	To—	Stage.	Date.
		Feet.			*Feet.*	
Connecticut	White River Junction, Vt.	13			12.0	3
Santee	Rimini, S. C.	12			10.9	10,11
Do	Ferguson, S. C.	12			10.8	11
GREAT LAKES.						
Cass	Vassar, Mich.	14			13.9	25
Grand	East Lansing, Mich.	8			7.3	29

TABLE 2.—*Floods in Ohio Basin, May, 1917.*

River.	Station.	Flood stage.	Above flood stages—dates.		Crest.	
			From—	To—	Stage.	Date.
		Feet.			*Feet.*	
Monongahela	Fairmont, W. Va.	25	28	28	25.2	28
Do	Greensboro, Pa.	30	29	29	20.0	29
Do	Lock No. 4, Pa.	31			28.9	29
Little Kanawha	Glenville, W. Va.	22	29	29	22.3	29
Do	Creston, W. Va.	20	28	29	24.0	28
Hocking	Athens, Ohio.	17			15.1	29
Licking	Farmers, Ky.	25			20.9	29
Do	Falmouth, Ky.	28			26.7	28
Wabash	La Fayette, Ind.	11			10.3	24
Do	Mount Carmel, Ill.	15			14.1	31
West Fork of White	Elliston, Ind.	19	28	31	23.0	30

TABLE 3.—*Floods in Mississippi River and tributaries, May, 1917.*

River.	Station.	Flood stage.	Above flood stages—dates.		Crest.	
			From—	To—	Stage.	Date.
Mississippi proper.		*Feet.*			*Feet.*	
Mississippi	Keokuk, Iowa	14			13.5	2
Do	Warsaw, Ill	17			16.6	2
Do	Quincy, Ill	14	1	8	15.3	3
Do	Hannibal, Mo	13	1	12	16.2	3,4
Do	Louisiana, Mo	12	1	11	15.2	3
Do	Grafton, Ill	18	3	8	18.9	5
Do	Cape Girardeau, Mo	30			27.7	5
Do	Arkansas City, Ark	42	1	4	46.6	1
Do	Greenville, Miss	42			40.4	1
Do	Vicksburg, Miss	45	1	6	48.5	1
Do	Natchez, Miss	46	1	8	49.3	1
Do	Baton Rouge, La	35	1	11	37.9	1,2
Do	Donaldsonville, La	28	1	9	29.6	1,2
Do	New Orleans, La	18	1	7	18.2	1,3,4
Eastern tributaries.						
St. Croix	Stillwater, Minn	11	1	7	11.7	2
Illinois	Beardstown, Ill	12	1	13	12.7	5,6,7
Do	Pearl, Ill	12	4	9	12.7	6
Yazoo	Swan Lake, Miss	25	1	3	26.2	1
Do	Yazoo City, Miss	25	1	19	29.5	1,2
Western tributaries.						
Meramec	Pacific, Mo	11	1	3	12.8	2
Do	Glencoe, Mo	15			13.6	1
Do	Valley Park, Mo	14	1	3	15.4	2
Bourbeuse	Union, Mo	10	1	1	10.5	2
St. Francis	Marked Tree, Ark	17	1	1	17.0	1
Atchafalaya[1]	Simmesport, La	41	1	7	41.7	1–3
Do	Melville, La	37	1	15	39.6	1,2
Missouri Basin.						
Missouri	Running Water, S. Dak.	16			14.7	26
Do	Blair, Nebr	15			14.6	29
Do	Kansas City, Mo	22			19.9	31
James	Huron, S. Dak	9			8.6	1,2
Solomon	Beloit, Kans	16	27	27	20.0	27
Grand	Chillicothe, Mo	18	1	8	25.1	4
Arkansas Basin.						
White	Batesville, Ark	23			21.2	5
Do	Georgetown, Ark	22			20.8	12
Black	Black Rock, Ark	14	4	9	16.5	5
Cache	Jelks, Ark	9			8.6	1
Red River Basin.						
Sulphur	Finley, Tex	24			23.8	5

[1] Tributary to Gulf of Mexico.

TABLE V.—*Floods in Pacific Coast drainage, May, 1917.*

River.	Station.	Flood stage.	Above flood stages—dates.		Crest.	
			From—	To—	Stage.	Date.
Sacramento Basin.		*Feet.*			*Feet.*	
Kings	Piedra, Cal	12			11.1	14
Columbia Basin.						
Columbia	Marcus, Wash	24	26	(*)	26.8	31
Do	Wenatchee, Wash	40			37.0	31
Do	The Dalles, Oreg	40			37.3	31
Do	Umatilla, Oreg	25			22.7	31
Do	Vancouver, Wash	15	15	(*)	21.7	31
Kootenai	Bonners Ferry, Idaho	26			23.6	30
Pend d'Oreille	Newport, Wash	16	26	(*)	18.4	31
Clearwater	Kamiah, Idaho	14	29	30	15.4	30
Willamette	Portland, Oreg	15	15	(*)	21.0	5

(*) Continued into June.

TABLE 4.—*Floods in West Gulf and Colorado drainage, May, 1917.*

River.	Station.	Flood stage.	Above flood stages—dates.		Crest.	
			From—	To—	Stage.	Date.
		Feet.			*Feet.*	
Trinity	Dallas, Tex	25	29	29	27.6	29
Rio Grande	San Marcial, N. Mex	11	1	(*)	14.7	20
Do	Rio Grande, Tex	15	13	13	17.8	13
Colorado	Topock, Ariz	14	21	31	20.4	25
Grand	State Bridge, Colo	9	18	18	9.8	18
Gunnison, North Fork	Paonia, Colo	9	15	31	9.2	18,19
Green	Green River, Wyo	9			8.4	24,25
Do	Elgin, Utah	13	21	25	13.7	23,25

(*) Continued into June.

MEAN LAKE LEVELS DURING MAY, 1917.

By UNITED STATES LAKE SURVEY.

[Dated: Detroit, Mich., June, 1917.]

The following data are reported in the "Notice to Mariners" of the above date.

Data.	Lakes.*			
	Superior.	Michigan and Huron.	Erie.	Ontario.
Mean level during May, 1917:	*Feet.*	*Feet.*	*Feet.*	*Feet.*
Above mean sealevel at New York	602.38	581.14	572.93	246.51
Above or below—				
Mean stage of April, 1917	+0.10	+0.36	+0.36	+0.27
Mean stage of May, 1916	+0.42	+0.70	+0.07	−0.62
Average stage for May, last 10 years	+0.47	+0.65	+0.15	−0.36
Highest recorded May stage	−0.67	−2.38	−1.49	−2.44
Lowest recorded May stage	+1.56	+1.58	+1.62	+1.55
Average relation of the May level to—				
April level	+0.3	+0.3	+0.4	+0.5
June level	−0.4	−0.3	−0.1	−0.2

* Lake St. Clair's level: In May, 576.07 feet.